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NINETEENTH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JANUARY 8, 1908.

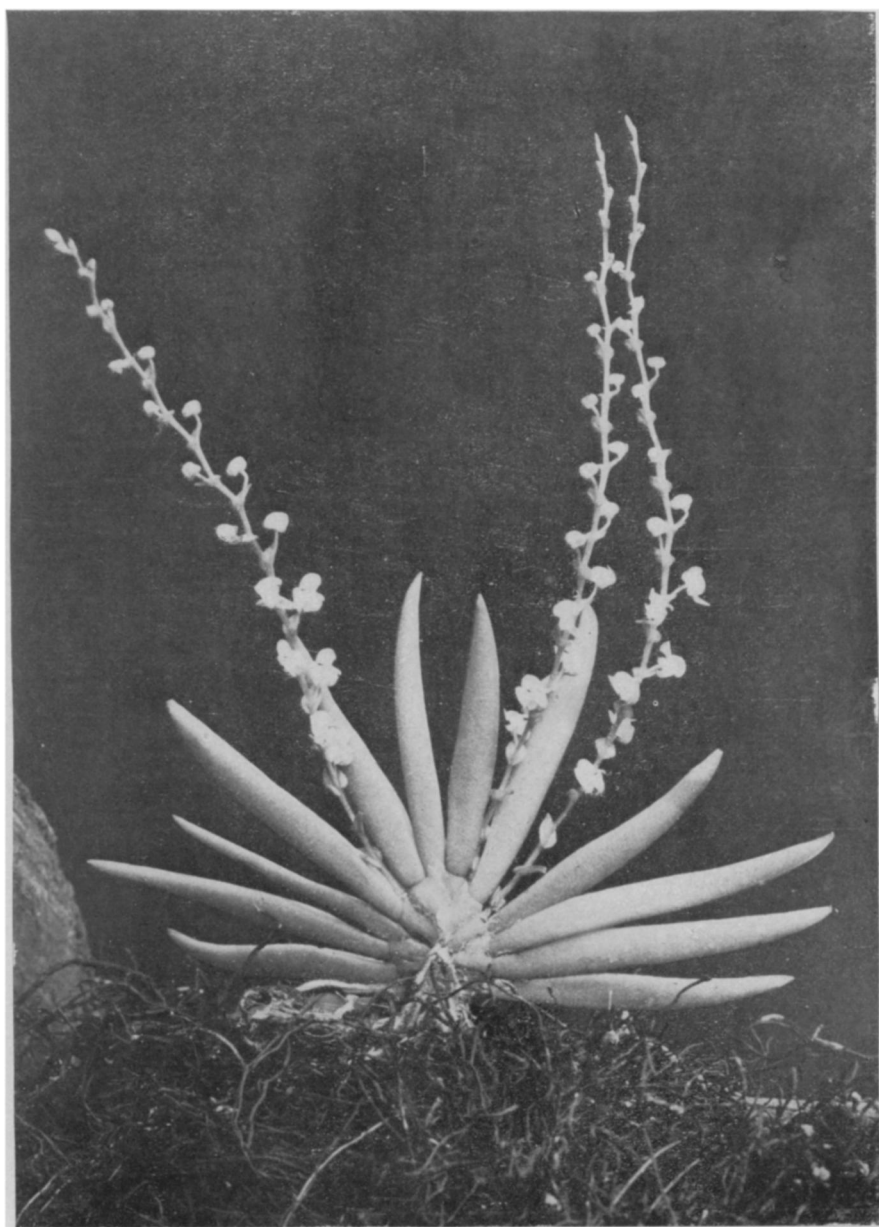
To the Board of Trustees of the Missouri Botanical Garden:

The following report on the Missouri Botanical Garden and the School of Botany connected therewith is respectfully submitted in compliance with the rules of the Board:—

GARDENING.

The area devoted to decorative planting being essentially unchanged, the number of individual plants used remains nearly the same from year to year. The parterre was again used in the early spring of 1907 for tulips, of which, here and elsewhere, 21,500 plants, representing nearly 200 varieties, were grown: an increase of 2,500 over the previous year. During the summer, the same ground was occupied by zonal and hybrid pelargoniums, of which 22 varieties were presented in contrasted masses, which aggregated 3,500 plants. As with tulips, this selection was supplemented in the customary manner by a much larger number of varieties of the same kind of plants grown elsewhere, but represented by a smaller number of individuals—the pelargoniums so grown numbering 2,250, including 212 named species or varieties. The other bedding features of the Garden have been maintained essentially as in immediately preceding years, but by the use of different plants. The most marked change was in the beds flanking the entrance walk and surrounding the parterre, where a simple fleur-de-lis design was worked out in *Alternanthera*, *Peristrophe*, and *Santolina*. The total number of bedding plants used in the Garden, aside from tulips, was 37,500.

Chrysanthemums were again grown in quantity, and through the fortnight beginning with November 4th, 4,000 choice plants, representing 400 varieties, were displayed under canvas in the parterre. As was the case last year, I desire



TRIZEUXIS FALCATA.

to record my most appreciative thanks for the aid rendered by Captain Robert McCulloch, of the United Railways Company, who kindly installed and maintained electric lights in the tent during the time that the chrysanthemums were on view, which again enabled me to open the tent to visitors in the evening. This season, the weather proved perfect during the time that the chrysanthemums were exhibited, and visitors for the fortnight numbered 33,521, of whom 8,601, or over one-fourth, came in the evening.

Plant and seed accessions for the year, aside from Garden propagations and collections, number 274, comprising 12,655 plants or packets of seeds. Of these, 6,859, representing 230 of the accession entries, and valued at \$605.35, were presented or received in exchange for similar material or for Garden publications, and 5,796, representing 44 entries, were purchased, the Secretary's books showing an expenditure of \$501.12 for such purchases, including transportation and other charges. The collections by Garden employees, exclusive of seeds for exchange purposes, number 1,726 plants, valued at \$123.86, and 51 packages of seeds, valued at \$3.50. Garden propagations amounted to 47,225 plants, valued at \$3,305.75, in addition to 7,665 seedlings, valued at \$383.25.

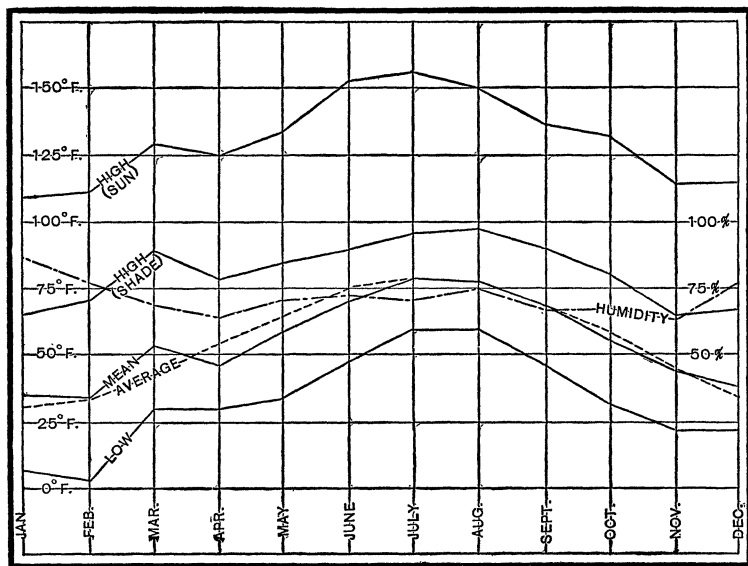
The exchange list issued by the Garden last winter included 1,519 species or varieties; and 5,686 packets of seeds, valued at \$284.30, selected from this list, have been issued to correspondents. Living plants to the number of 4,612 (of which 4,000 were bulbils of henequen), valued at \$145.55, have also been distributed to correspondents. In addition to these exchange distributions, 747 duplicate plants from the Garden collections have been presented to schools and colleges for educational use, and 1,300 bedding plants removed from the grounds at the approach of winter, or remaining after the beds had been planted in the spring, were placed in the kindergartens and playgrounds of the city schools. The surplus of chrysanthemum plants which were still usable when removed from the tent, together with many cut flowers, were distributed to hospitals and similar charities. The total number of plants so distributed through the year amounts to 642.

The records show that 1,502 species or varieties were added to the collection of living plants in 1907, and that 658 were lost or discarded, leaving a net gain of 844; the total reported at the end of the year being 17,916, as compared with 17,072 noted for 1906.*

THE WEATHER.

The accompanying diagram A graphically presents the monthly variation in temperature as derived (except for

DIAGRAM A.



TEMPERATURE. HUMIDITY.

the solar maximum) from the records of the local office of the Government Weather Bureau; and diagram B shows the distribution of rainfall through the season, as indicated by the same records. The most striking deviations from earlier averages are found in the marked warmth of the last week in March, when the temperature was that of early summer, and

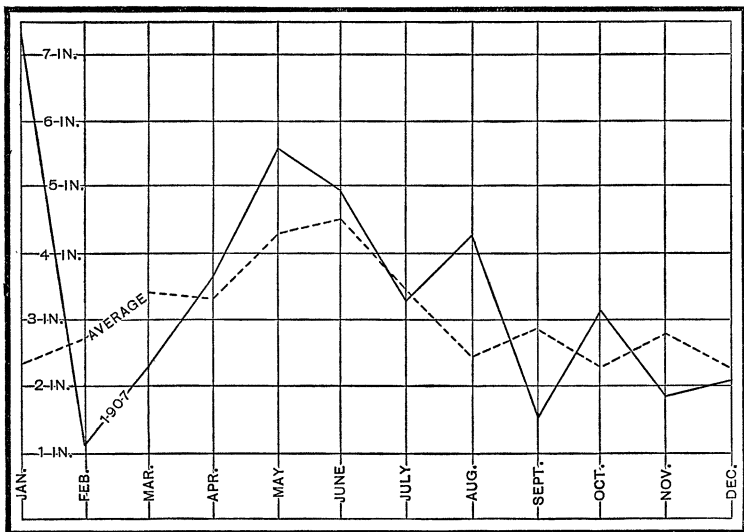
* Rept. Mo. Bot. Gard. 18: 15.

the very heavy precipitation in January, followed by a slight drought in February and March. The average temperature through the summer was almost exactly the summer average for the period covered by Government records.

VISITORS.

Except during the World's Fair, there has been no year in which so many people have visited the Garden as during the past season, the number being 135,497. Of this total, 26,114

DIAGRAM B.

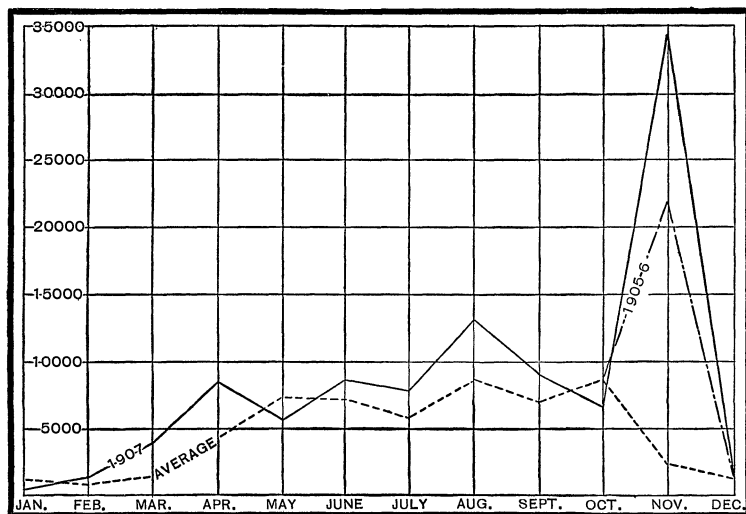


PRECIPITATION.

were recorded for the open Sunday afternoon in June, and 10,093 for the corresponding Sunday afternoon in September, which was very hot and sultry, the remaining 99,290 being week-day visitors. As for several years preceding, an unusually large number of persons were attracted in March and April by the tulips, and in November by the chrysanthemums, the November visitors this year amounting to 34,439, or something over one-third of the week-day total for the year.

The appended diagram C shows the seasonal distribution of week-day visitors contrasted with the average for earlier

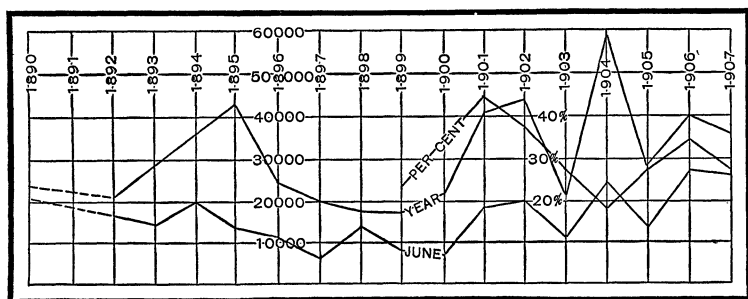
DIAGRAM C.



VISITORS ON WEEK-DAYS.

years since records have been kept (excepting the Exposition year, 1904).* The lower November average on this diagram,

DIAGRAM D.



SUNDAY VISITORS.

which may be taken as normal to this season of the year, is also exclusive of the years 1905 and 1906, in which the

* Rept. Mo. Bot. Gard. 16: 18.

display of chrysanthemums likewise greatly increased the number of visitors—their average for these two years being indicated separately by a broken line.

The relation of Sunday visitors, who this year amounted to 26.7 per cent. of the total, to week-day visitors, is graphically shown on diagram D. During the year, 736 copies of the little Handbook of the Garden were bought by visitors, exhausting the edition placed on sale at the beginning of 1905, and necessitating the issuing of a new and revised edition.

THE HERBARIUM.

The established practice of purchasing current collections for the herbarium has been continued, and advantage has been taken of a number of opportunities to secure useful small herbaria at various times through the year. Among the more important specimens that have been incorporated are the remainder of the Reverchon* herbarium (11,401 sheets), a representative series of duplicates from the Gandoger† herbarium (7,591), a portion of the Fink ‡ herbarium (3,450), Dr. Hedgcock's herbarium (1,411), Lindheimer's¶ collections of 1849-1851 (1,317), Pitard's Canary Islands plants (925), and nearly 1,000 specimens, mostly Mexican, collected by Dr. Edward Palmer.

The incorporated additions for 1907 amount to 35,876 sheets of specimens, of which 3,706, valued (unmounted) at \$185.30, were presented or received by way of exchange; 603, valued at \$30.15, were collected by employees; and 31,567 were acquired by purchase, the expenditure for such specimens and material, shown by the Secretary's books, being \$1,952.64.

Among the unincorporated material forming a part of the Engelmann herbarium§ were some 20,000 specimens of Texan plants collected by Ferdinand Lindheimer between 1849 and 1851. These have now been named, and a full set in duplicate deposited in the Garden herbarium. The

* Rept. Mo. Bot. Gard. **18**: 18.

† Rept. Mo. Bot. Gard. **17**: 33.

‡ Rept. Mo. Bot. Gard. **17**: 33.

¶ Rept. Mo. Bot. Gard. **18**: 159.

§ Rept. Mo. Bot. Gard. **1**: 62, 93. **2**: 24. **3**: 15.

residue have been made up into 39 sets for distribution to the principal herbaria of the world, where, being especially rich in typical illustration of the Texan flora, they will prove of much value.

The herbarium, so far as now mounted, consists of:—

The Engelmann Herbarium (all groups) 97,859 specimens.

The General Herbarium:—

Higher plants.

The J. J. Bernhardt Herbarium	61,338	
The Henry Eggert Herbarium*	23,495	
The J. H. Redfield Herbarium	16,447	
The Sturtevant and Smith Herbarium	7,446	
The Gustav Jermy Herbarium	4,789	
The A. W. Chapman Herbarium*	3,536	
The Julien Reverchon Herbarium*	17,210	
The Nicholas Riehl Herbarium	3,359	
Other specimens	312,065	449,682 “

Thallophytes.

The J. J. Bernhardt Herbarium*	610	
The Gustav Jermy Herbarium	1,659	
The S. M. Tracy Herbarium*	4,312	
The Wm. Trelease Herbarium	11,000	
Other specimens	30,021	47,602 “
Making a total of	595,143	“
Valued at		\$89,271 45†

Supplementing the herbarium, and the shelved or incorporated exsiccatae, which are here counted as a part of it,‡ the Garden possesses specimens of economic plant-products, woods, seeds, etc., valued at \$175.00, and 1,851 preparations for microscopic study, valued at \$410.00, which have not been added to since their enumeration in my last report.§

THE LIBRARY.

Though no standing appropriation for the purchase of books has been available, the maintenance allowance has sufficed for more important current publications, and special

* So far as yet incorporated.

† This valuation at the rate of \$15.00 per hundred mounted sheets.

‡ Rept. Mo. Bot. Gard. 16: 21. § Rept. Mo. Bot. Gard. 18: 20.

appropriations have made it possible for me to secure the rare Seville edition, of 1535, of Oviedo's *Historia General de las Indias*, as well as several of the early publications of De Laet and others on the West-Indian region.

The list of biological serial publications represented in the libraries of St. Louis, to which reference has been made in earlier reports,* is now said by the librarian to be ready for publication; and, as it promises to be helpful to local workers, I trust that it may be printed in the course of the present year. As in 1906, in addition to caring for current accessions and working on this list, the cataloguers have been occupied with a general shelf revision of the library, and during the year 7,226 of the catalogue cards have been replaced by new and verified cards.

Additions number 947 books, valued at \$1,612.25, and 2,116 pamphlets, valued at \$357.65, presented or received in return for Garden publications; and 233 books and 40 pamphlets bought, the expenditure for purchases and binding amounting to \$2,227.15.

The card index has been enlarged by the addition of 58,668 cards, of which 47,148 were written by employees, the remainder being purchased. Special attention has been given to indexing plant illustrations, and the literature of floral ecology and germination, the librarian's hope being that the entries referring to the last-named subject, which are already some 52,000 in number, may eventually be published in the form of a detailed bibliography.

The serial publications now received number 1,416, of which 99 are bought, and 1,317, issued by 935 institutions or publishers, are received in exchange for the Reports of the Garden. This number is 57 larger than that reported last year.

As now constituted, the library contains:—

Pamphlets	33,735		
Books	24,421		
	58,156	valued at	\$86,597 78
Manuscript volumes	77	" "	910 00
Total	58,233	" "	87,507 78
Index cards	629,921	" "	6,299 21
Total valuation of library			\$93,806 99

* Rept. Mo. Bot. Gard. 17: 36. 18: 20.



ONCIDIUM IRIDIFOLIUM.

RESEARCH AND THE USE OF FACILITIES.

Under the fixed policy of administration, a number of Garden employees have given such time as could be spared from necessary maintenance duty to research work, some of the results of which have been published in the last volume of the Garden Report, or are in course of preparation for publication. It was my own privilege, early in the year, to spend two months in a field study of the Agaves of certain of the West Indies, the results of which are now being brought into form for publication.

The engagement of Professor Blankinship, reported a year ago,* made possible a long delayed study of the enormous mass of herbarium material collected in Texas by Ferdinand Lindheimer between 1849 and 1851, which came to the Garden many years ago as a part of the Engelmann herbarium. Supposed at first to represent duplicates, these specimens were found to be actually unnamed plants intended for sale to the subscribers to Lindheimer's "Flora Texana Exsiccata" of sixty years ago, with few exceptions unrepresented in collections, and even lacking from Engelmann's own herbarium. To their study, Dr. Blankinship has brought a conservative spirit consonant with that of the great botanists Engelmann and Gray, whose publications on Lindheimer's earlier collections have given them classic value; and his recently published paper on this later material† is enriched by an authentic and appreciative sketch of Lindheimer, the collector, whose earlier known work has also been correlated with that which is now first made known.

As in earlier years, the facilities of the Garden have been freely placed at the disposal of visiting botanists, and the usual loans have been made and office assistance rendered to those who were unable to come to St. Louis for study. Perhaps the most important use to which the Garden has yet been put by visitors was a study of transpiration, comparative with results reached in the desert regions, to which

* Rept. Mo. Bot. Gard. 18: 22.

† Rept. Mo. Bot. Gard. 18: 123.

Dr. Burton E. Livingston of the Carnegie Institution devoted some two months of residence in the late winter and early spring.

THE HENRY SHAW SCHOOL OF BOTANY.

At the end of the last college year, Mr. A. C. Life, who had served efficiently as Instructor for three years, resigned his position to accept an appointment in the University of Southern California. The vacancy so created has been filled by the appointment of Mr. W. A. Ruth as Assistant in the School of Botany.

A re-arrangement has been made of the electives offered to undergraduate students,* the present courses, in addition to a joint course in biology, being announced in the University Catalogue as follows:

1-2. Botany: Elementary Morphology and Organography. Laboratory work, with supplementary lectures and quizzes, dealing with the form and structure of plants, with special reference to their life processes, including ecological adaptations, and to Systematic Botany.

Students who have taken Courses 1 and 2 may join the field excursions in a subsequent spring, for advanced ecological study counting for a credit of 1 unit. In such cases a thesis will be required of the student upon a topic assigned by the instructor.

4. Plant Relations: Lectures, with demonstrations, on the vegetable kingdom: Dealing with the structure and physiology of plants, their relations to environment, past history, variation, heredity, evolution, economic uses, etc. Second term, twice a week. 1 unit. Open to all classes.

5-6. Plant Physiology, including Ecology. Laboratory work, with supplementary lectures.

7-8. Cytological Technique. Laboratory work in the cultivation and examination of bacteria and the methods of histological investigation, combined with a study of the principal types of plant anatomy—specially adapted to the needs of students intending to study medicine.

9-10. Systematic Botany. Laboratory and field work, with supplementary lectures, dealing with the comparative structure and the classification of plants.

11-12. Plant Pathology and Applied Mycology. Laboratory work.

The enrollment for the first term of 1907-8 was:—"Biology 1," 10; "Botany 1," 6; "Botany 5," 12; "Botany 7," 2;—

* For comparison see Rept. Mo. Bot. Gard. 17: 38.—Unless otherwise noted, each course is entitled to a College credit of 3 units.

a total of thirty students, of whom the ten first noted give about equal time to botany and zoology, the others taking one full botanical course each. Though not so large as two years ago, this enrollment is slightly larger than that of last year.

At the 1907 Commencement of Washington University, the degree of Master of Arts was conferred on Miss Anna E. Tensfeld, for work in botany. It may be proper to note that at this anniversary Commencement, the honorary degree of Doctor of Laws was conferred on the Director of the Garden, who has also been the responsible head of the School of Botany since its establishment in 1885.* There are now registered at the University one candidate for the Master's degree, and one for the Doctor's degree, with botany as a major study.

GARDEN PUPILS.

In March, Mr. Shelby C. Jones and Mr. George D. Schulte, who had completed the course and passed an examination satisfactory to the Garden Committee, were given the customary certificate. On the results of competitive examination, duly announced, the scholarships which had been held by Mr. Federer, whose resignation was reported a year since, and Mr. Jones, were awarded to Mr. Arthur H. Smith, of Marshalltown, Iowa, and Mr. Raymond B. Wilcox, of Waterloo, Wis., and, on nomination of the Missouri Horticultural Society, the remaining scholarship was granted to Mr. Jesse B. Tuggle, of Parkville, Mo. In August, Mr. Paul Roper, who had held a scholarship on the nomination of the St. Louis Florists' Club since October 1, 1904, relinquished it, to return to his home, and on nomination of the same Club the scholarship was re-awarded to Mr. Edwin Nyden, of Kenosha, Wis.

No change has been made during the year in the teaching staff or the prescribed course of study; but in October the Board recorded its appreciation of the unsolicited action of the Corporation of Washington University in opening its courses in entomology, without payment of tuition, to

* Rept. Mo. Bot. Gard. 1: 59.

Garden pupils, several of whom have availed themselves of the privilege thus afforded of doing extra work in the College.

THE GARDEN STAFF.

Aside from a reduction in the number of persons temporarily employed in both library and herbarium, the only changes in the salaried office force to be reported are the engagement, in the latter part of the year, of Professor Moses Craig as Herbarium Assistant, to succeed Professor J. W. Blankinship, who had held the post for a year; and the appointment, early in the season, of Miss Isadore Smoot as Library Cataloguer, to fill the vacancy reported last year.

In June, the post of Plant Pathologist, created by the Board, was filled by the honorary appointment to that office of Dr. Hermann von Schrenk, who entered upon it on the first of the succeeding month, and has since devoted to the study of plant diseases such part of his time as could be spared from his professional engagements as a timber expert.

SPECIAL TESTAMENTARY PROVISIONS.

All of the annual events explicitly provided for by the will of Mr. Shaw have taken place in 1907.

The flower sermon was preached in Christ Church Cathedral, St. Louis, on the morning of May 12th, by the Right Reverend Robert Strange, Bishop of East Carolina.

The Trustees' banquet was given at the Southern Hotel, St. Louis, on the evening of November 30th, 1907, this date being selected because there were then meeting in St. Louis the Central Association of Science and Mathematics Teachers and the Southwestern Section of the American Mathematical Association; a large proportion of the 181 guests were representative of these two associations. Bishop Tuttle presided, and speeches appropriate to the occasion were made by Professor C. M. Woodward, of Washington University, Professor C. A. Waldo, of Purdue University, Professor H. E. Slaught, of the University of Chicago, Professor E. R. Hedrick, of the University of Missouri, and Honorable C. P. Walbridge, of St. Louis.

The eighteenth gardeners' banquet was given at the Southern Hotel, on the evening of August 14th. One hundred and thirty-five guests were seated, of whom about one-half were members of the American Apple Growers' Congress, which was then meeting in St. Louis. The Director of the Garden presided, in accordance with the direction of Mr. Shaw's will. On the conclusion of the dinner, appropriate speeches were made by President H. M. Dunlap, of the American Apple Growers' Congress, Honorable Philip C. Scanlan, Park Commissioner of St. Louis, Professor M. B. Waite, of the United States Department of Agriculture, Honorable Norman J. Colman, Ex-Secretary of Agriculture, Mr. Walter Retzer, of St. Louis, President L. A. Goodman, of the American Pomological Society, and Chairman J. C. Vaughan, of the National Council of Horticulture.

The premiums designated for a flower show were this year awarded through the St. Louis Horticultural Society, at an exhibition held in the week beginning with November 11th. The awards included a gold medal* to Mr. W. A. Manda for his introduction of *Dracaena Mandaiana*.

Very respectfully,

WILLIAM TRELEASE,
Director.

* Rept. Mo. Bot. Gard. 5: 18. 9: 19. 11: 20. 16: 29.